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ABSTRACT

A decision-making approach to the study of adolescents' risky behaviors is described in detail. In contrast to other approaches, the decision-making approach assumes only that risk taking involves choosing among alternative courses of action, and that the chosen alternative, by definition, entails some chance of loss. A short definition of risky behavior is followed by a description of the decision-making perspective. A demonstration of the ways in which risky behaviors can be approached from such a perspective and an account of some advantages of the approach are offered. The advantages are then highlighted in a section which uses the decision-making approach to reexamine some widely held beliefs regarding adolescents' risky behaviors. Subsequent discussion: (1) explores implications of the decision-making perspective for education; (2) examines difficulties and shortcomings of the decision-making perspective; and (3) offers a brief review of other perspectives on risk taking. Concluding material offers a summary discussion of the claim that adolescents take risks unduly. A total of 116 references are cited. (RH)

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RISK TAKING IN ADOLESCENCE: A DECISION-MAKING PERSPECTIVE

Lita Furby and Ruth Beyth-Marom

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Introduction

In recent years there has been a growing concern that many adolescents are engaging in inordinately risky behaviors (Blackman et al., 1985; Goleman (no date); Irwin & Millstein, 1986; Tonkin, 1987). Though the activities of concern are often ones in which many adults engage as well (e.g., driving, sex, drug use), adolescents are criticized for acting in ways that engender greater risk (e.g., reckless driving, sex without contraceptives, health-compromising and addictive drug use). Risk taking is sometimes recognized to be a normal part of adolescent development (Baumrind, 1983), but there nevertheless exists an overriding concern that adolescents are taking risks that are detrimental to their health and well-being.

Diverse efforts to reduce adolescents' risk taking have developed, each based on a different set of assumptions. Some assume that adolescents are not fully aware of the risks associated with their behaviors and that ensuring they have the relevant information would result in less risk taking (e.g., Bachman et al., 1988). Others assume that adolescents have the information but cannot resist peer pressure; thus, teaching them to say "no" would be the most effective treatment (U.S. Department of Health & Human Services, 1986). Still others suggest that adolescents engage in risky behaviors as an outlet to their problems during the stressful period of adolescence and that exposure to alternative outlets might be the best way to reduce adolescents' risk taking (Wills,

1985).

The present approach does not make any of the above assumptions. Rather, it assumes only that risk taking involves choosing among alternative courses of action, and that the chosen alternative, by definition, entails some chance of loss. Since any choice is the result of decision making regarding various options, in order to understand whether and why an individual chooses to take (or not take) risks, it is essential to examine that decision-making process.

After a short definition of risky behavior in the next section, we describe the decision-making (DM) perspective, followed by a demonstration of how risky behaviors can be approached in such a perspective, and what some of the advantages are of that approach. The advantages are further highlighted in a subsequent section which uses the DM approach to re-examine some widely held beliefs regarding adolescents' risky behaviors. We then explore the possible implications of the DM perspective for education, and call for a developmental theory of decision making. The two subsequent sections examine some of the difficulties and shortcomings of the DM perspective, and offer a short discussion of other perspectives on risk taking. We conclude with a summary discussion of the possible validity of the claim that adolescents are undue risk takers.

While this discussion is necessarily exploratory and tentative, it offers a new perspective by drawing together research and observations from two distinct fields, developmental psychology

and the psychology of judgment and decision making under conditions of risk and uncertainty. It attempts to integrate a large number of studies related to adolescent risk taking, showing whether and how each addresses issues defined by a decision-making perspective.

Risk Taking from a Decision-Making Perspective

What is risk taking?

The term risk, when used in the research literature (Slovic, 1964) as well as in the general language (Morris, 1981), refers to a chance of loss, that chance being greater than 0% but less than 100%.[1] Thus, the definition of risky behavior which we shall adopt is action (or inaction) that entails a chance of loss.[2] The definition of risk taking which we shall adopt is engaging in risky behavior.

Risk taking may or may not be deliberate. That is, one may or may not be conscious that a given behavior entails a non-zero probability of loss. If an individual chooses to engage in a given behavior without being cognizant that it entails a chance of loss, that individual could be taking a risk, even though the individual would not be conscious of doing so.

Risk perception has traditionally referred to an individual's assessment of the probability of loss associated with a given action (or inaction). The literature has remained mute as to whether that probability assessment must be conscious. (Even when one does not consciously perceive a chance of loss, there is the possibility that one unconsciously perceives a risk.) However,

empirical techniques have been limited to eliciting conscious risk perceptions, and in what follows we will adopt the convention that "risk perception" refers only to a conscious probability assessment.

What is decision making?

Decision theorists define decision making as the process of making choices among competing courses of actions (Raiffa, 1968; von Winterfeldt & Edwards, 1986). The normative models of decision theory prescribe the processes that people should follow in order to have the best chance of maximizing their well-being, given their beliefs and values. The following are the steps specified by these models:

1. Identify the possible options. Any choice usually depends not only on the characteristics of the final chosen alternative but also on the characteristics of the other options considered. Thus, the identification of all feasible options should be the first step in any process of decision making. For a decision dealing with whether to engage in a particular behavior (e.g., smoking a cigarette), there are just two options (e.g., to smoke or not to smoke). Other decision situations (e.g., "what shall we do tonight?") may call for consideration of more than two alternatives.

2. Identify the possible consequences that may follow from each of these options. Typically, the possible consequences differ from option to option. Even if they were identical for each

option, one would still have a meaningful decision to make as long as the consequences' probabilities varied across options (see d below).

3. Evaluate the desirability of each of those consequences. By our definition, risk is present in a decision only if at least one possible consequence of at least one option is valued negatively (i.e., entails some loss).

4. Assess the likelihood of those consequences. Whenever the likelihood of any of the possible losses is greater than zero but less than one, then risk perception is a potentially important element of the decision-making situation.

5. Combine the above according to some "decision rule" in order to identify the "best" option. A widely accepted normative criterion for the best option is that which maximizes one's well-being. One definition of "rational" behavior is choosing that option which appears to maximize well-being, given the decision maker's knowledge and beliefs (e.g., about consequence probabilities and values). One common rule for making a rational choice is to select that option which has the greatest "subjective expected utility" (SEU). The latter is obtained by multiplying the judged desirability of each possible consequence by the perceived probability of its occurring, and then summing those products for all the possible consequences of a given option. However, maximizing SEU is just one of a number of possible rules that might be equally defensible as means of maximizing well-being.

From the perspective of decision theory, the preferred choice when using a given decision rule depends on which options an individual decision maker identifies for consideration, and how that decision maker evaluates both the desirability of the various possible consequences of undertaking those options as well as the likelihoods of those consequences occurring. Thus, using a given decision rule, the optimal choice depends on that decision maker's personal values and perceptions.

In contrast to the normative decision model which prescribes how decisions should be make, behavioral decision theory examines how people actually do make decisions (Fischhoff, 1988; Kahneman, Slovic & Tversky, 1982). Research here focuses on how people identify alternative options, how they identify possible consequences, how they assess the desirability and likelihood of those consequences occurring, and what decision rules they use to reach a choice. Thus, both perspectives use the five steps as a framework, either for describing what people should be doing (in the normative perspective) or for analyzing what they actually do (in the descriptive perspective).

Decision making about risky behavior

Now let us examine exactly how the decision-making perspective can be applied to analyzing risky behavior. Taking drugs is one of the behaviors for which adolescents are criticized because it can be risky. Imagine a teenager at a party where marijuana is passed around. She is faced with a decision about whether to smoke

it or not. Let us examine this decision from a DM perspective, in terms of the five steps described above:

1. Identify possible options. The decision facing this teenager involves two alternatives, to smoke marijuana or not to smoke it.

2. Identify possible consequences that may follow each option. The exact list of possible consequences depends on the individual who is facing this decision. Some possible consequences of choosing to smoke marijuana are that she will feel high, she will feel part of the group, she will disappoint her parents, she will feel sick, she will get addicted, and she will enjoy trying something that is illegal. Some possible consequences of not smoking are her feeling good about not giving in to social pressure, her friends' calling her a "goody goody," and her regretting her decision later.

3. Evaluate the desirability of each possible consequence. Each possible consequence might be more or less desirable for different individuals. For example, being part of the group might be very important for one teenager but less so for another.

4. Assess the likelihood of each possible consequence. Just as individuals might differ in their consequence desirability judgments, they might also differ in their assessments of the probability that a given consequence will occur. For example, some may feel that there is no chance they will become addicted if they choose to smoke the marijuana being passed around at this party, whereas others may feel that there is at least a small probability

they could become addicted as a result of smoking it.

5. Combine all of the above information according to some decision rule. As mentioned above, choosing that option with the largest subjective expected utility has been one suggested decision rule, but there are others that can be defended as equally effective in maximizing one's well-being. For example, adults who criticize adolescents for risk taking might advocate a decision rule that eliminates an option if it has any chance at all of a very big loss, even if that chance is very small and the subjective expected utility of that option is larger than the SEU for any other option.

From this decision-making perspective, we can see that nearly any behavior is risky, because a risky behavior is simply any action (or inaction) that entails a chance of loss. Smoking marijuana may be risky if it entails a chance of becoming addicted. However, not smoking is also risky if it entails a chance of being rejected by one's peers. Similarly, not wearing one's school uniform may be risky if there is a chance of getting into trouble with school authorities, but wearing one's uniform may also be risky if one might be rejected by friends. It is often difficult to find options that do not entail some possible loss. Thus, almost whatever one chooses, one takes a risk. Both smoking and not smoking marijuana usually entail some chance of loss, hence both are usually risky behaviors.

From this perspective, there is little meaning to the claim that adolescents are risk takers, since nearly whatever one does

entails some risks. However, adolescents' choices may be different from those adults who think that they themselves would have taken in their stead, and in a way that leads adults to feel that adolescents take inordinately high risks. By examining the various steps of the decision-making process specified by decision theory, we can identify the following possible reasons why adolescents' decision making might differ from that of adults such that the former would choose to engage in "risky behavior" that the latter deem unadvisable.

1. Adolescents and adults might consider different options. It could be, for example, that where an adolescent sees the two options of smoking a joint or refusing it, an adult might see three options for the adolescent: smoke marijuana, take the joint and only pretend to smoke it, and refuse the joint. Thus, one possibility is that adults view adolescents' decisions as "irrational" only because adults and adolescents are considering different options (and that if they considered the same options, they would make the same choice). This possibility has not been examined empirically.

2. Adolescents and adults might differ in their identification of the possible consequences that may follow from one or more options being considered. Of course, the only consequences which are likely to (and logically should) affect a choice are those that are valued (either negatively or positively) by the decision maker. Adolescents may contemplate some valued consequences that adults fail to consider, or vice versa. For

example, adolescents may think about the possibility that smoking marijuana at a party will result in their feeling more competent in their ability to handle drugs without losing control; adults might fail to consider this possibility (perhaps because they do not think of it, or because they think the probability is zero that it would result from smoking marijuana). Even when adolescents and adults consider the same consequences, they may differ in how large they judge those possible consequences to be. For example, adults may imagine that refusing to smoke marijuana could lead to only minor peer rejection among adolescents (e.g., being called a "sissy" on that occasion), whereas adolescents may imagine a much larger dose of peer rejection (e.g., being snubbed for months).

3. Adolescents may value some of the possible consequences of options differently than adults do. Such differences might occur in two general ways: (a) Adolescents and adults might differ in the valence they attach to a consequence, one seeing it as negative and the other as positive. For example, adolescents might view the altered state of feeling high from smoking marijuana as positive (because they think it feels good) whereas adults might view that possible consequence as negative (because they see it as a false and unrealistic sense of well-being), or (b) Adolescents and adults might differ in the magnitude of their evaluations, either in how negatively they see the same loss or in how positively they perceive the same gain. For example, adults might view a 20% probability of getting addicted from smoking marijuana as worse than adolescents do, or adolescents might view a 20%

probability of being rejected by their peers as worse than adults do. Such differences might cause adolescents to choose one option (that of smoking marijuana) while adults would recommend the other (that of not smoking), both for quite rational reasons. Analogously, adolescents might view some positive consequences (gains) more positively than adults do, and other gains less so. For example, adults may perceive the possibility of feeling good about not giving in to peer pressure as much more desirable than adolescents would, and adolescents might perceive the possibility of having a good time with one's friends as more desirable than adults would. Again, such differences alone could result in adolescents' choosing the smoking option and adults' thinking that adolescents should rationally choose the non-smoking one.

Such differences in values might explain seemingly surprising findings by Kegeles et al. (1988) that 14-19 year-olds' intention to use condoms was not related to their beliefs about the degree to which condoms prevent venereal disease or pregnancy. Individuals who believed that condoms would reduce their risk of pregnancy and disease most, were no more likely to report intending to use condoms, meaning that the difference in perceived riskiness of sexual intercourse with and without condoms appeared to play no role in their decisions regarding whether to use condoms. Instead, condom use intentions were correlated with their beliefs about the degree to which condoms are easy to use, are popular with peers, and facilitate spontaneous sex. If this is true, perhaps it is because these adolescents attribute much greater importance to

popularity with peers, spontaneous sex, and ease of use than they do to pregnancy prevention. In contrast, adults probably assume that adolescents should attach greatest importance to avoiding pregnancy.

4. Adolescents may assess differently than do adults the likelihood of some of the consequences. Such differences might occur with respect to either positive or negative consequences. For example, adolescents might perceive the probability of a loss like addiction to marijuana (as a result of smoking a joint) as lower than adults do. Or, adolescents might perceive the probability of rejection by friends (as a result of refusing to smoke) as higher than adults do. Analogously, adolescents and adults might differ in their probability assessments concerning gains. For example, adolescents might have a higher assessment (than adults do) of the probability of having fun as a result of smoking, or they might have a lower assessment of the probability of feeling good about not giving in to peer pressure as a result of not smoking.

One example in the literature of this kind of difference is suggested in Shtarkshail's (1986) reanalysis of two studies by Slovic, Fischhoff and Lichtenstein (1980, 1985). In these studies, respondents were asked either to rank 30 technologies and activities according to "their risk of death," or to estimate for each one the number of deaths in an average year. Both measures can be interpreted as reflecting respondents' estimates of the risk of engaging in an activity or using a technology. Shtarkshail's

reanalysis suggested a tendency for the adolescent and young adult sample to judge technologies (e.g., nuclear power, food preservatives, pesticides) as more risky, and activities (e.g., hunting, mountain climbing, swimming) as less risky, both absolutely and relatively, than did the middle-aged adult sample.

To the degree that there are activities judged to be less risky by adolescents than by adults (e.g., the probability of dying from them is judged to be lower by adolescents than by adults), adolescents may not be consciously taking any more risks by engaging in those activities than adults would deem advisable. However, since adults perceive those activities as riskier than do adolescents, adults might criticize the "reckless" risk taking of the younger generation. Interestingly, Shtarkshail's analysis suggests that the reverse might be the case for at least certain technologies. There, it is the adolescent and young adult sample which perceives a higher probability of negative outcomes, and thus who might be expected to criticize the risk taking of their elders.

Another example of a possible difference between adolescents and adults in judgments about the likelihood of negative consequences comes from Phelps' (1987) study which found that college students' perception of the chances of being in a car accident when driving after six or more drinks, compared to that when sober, seemed to be far too low (the former being judged 7.5 times more probable than the latter, when it is actually about 100 times more probable). This finding suggests that older adolescents and young adults may drink and drive in part because they greatly

underestimate the degree to which drinking increases their chances of being in an accident. However, we need similar studies on the accuracy of older adults' perception of the riskiness of drinking and driving in order to establish whether this underestimation of risk is peculiar to adolescents.

5. Adolescents may use a different decision rule than adults do. No doubt, most adults as well as adolescents do not calculate their expected utility of each option and choose the alternative highest on this measure. However, an optimal choice requires paying attention to at least every feasible alternative that entails a possible consequence that the decision maker cares about, and then considering this information when making a choice. For example, when contemplating whether to smoke, one should pay attention to all possible valued consequences of smoking as well as to those of not smoking in order to make a rational choice. Adolescents an adults might differ in the decision rule they use to integrate all of this information, each believing that the rule they use will maximize well-being.

In sum, the decision-making perspective permits a systematic comparison of adolescents' decision processes with those of adults. To be useful, any such comparisons must examine all components of the decision-making process. It is not enough, for example, to compare only what adults and adolescents think about the consequences of smoking marijuana, because what they think about the consequences of not smoking may also play a significant role in determining their respective choices. As will be seen below,

various attempts to account for the alleged unduly risky behavior of teenagers have typically focused on only a single step of the decision-making process, and that may account for their lack of explanatory success.

What We Think We Know about Adolescent Decision Making with Respect to Risky Behavior: Myths vs. Facts

Although there is little empirical research on adolescent decision making and risk taking, there is no paucity of beliefs about how to characterize adolescent behavior in these areas. The following are some common characterizations of adolescent decision making and risk taking, along with a discussion of how the decision-making perspective can clarify what each means and facilitate empirical verification.

1. Adolescents are not capable of competent decision making. While adolescents, and minors in general, have been recognized in recent decades as possessing fundamental Constitutional rights, the Supreme Court has also maintained that the Constitutional rights of minors cannot be equated with those of adults because minors lack decision-making skills: "During the formative years of childhood and adolescence, minors often lack the experience, perspective, and judgment to recognize and avoid choices that could be detrimental to them" (Justice Powell, in Bellotti v. Baird, cited in Gardner, Sherer and Tester, 1989); "Most children, even in adolescence, simply are not able to make sound judgments concerning many decisions, including their need for medical care

or treatment" (Chief Justice Burger in Parham v. J.R., cited in Gardner, Sherer and Tester, 1989).

In contrast to the Court's opinion, some researchers have claimed that, "The existing literature clearly suggests that for most purposes, adolescents cannot be distinguished from adults on the grounds of competence of decision making along (for reviews, see Grisso & Vierling, 1978; Melton, 1981; Weithorn, 1982)" (Melton, 1983, p. 100). Typical of such studies, Weithorn and Campbell (1982) evaluated adolescents' decisions in response to hypothetical dilemmas about medical and psychological treatment and reported that 14-year-olds could not be distinguished from adults on such competency criteria as evidence of choice, reasonable outcome of choice, reasonable decision-making process, and understanding of facts. Similar results have been reported for decisions regarding consent to research participation and abortion (e.g., Keith-Spiegel, in press; Lewis, 1980).

Melton's conclusion and the studies reviewed by him have been criticized by Tester, Gardner and Wilfong (1987) who point out that respondents in these studies are typically presented with a hypothetical decision situation, asked to make a choice, and then interviewed concerning the factors that influenced their choice. Tester et al. question whether even adults can accurately identify the factors influencing their decision-making processes, and thus they are reluctant to rely on the results of studies that use a clinical interview procedure to establish those factors. In their own experimental study of information use in a decision task,

Tester et al. report that 12-13 year-olds use less information about possible options, possible consequences, utilities, and probabilities (in a simple gambling situation) than do adults, suggesting that adolescents may not, in fact, be as competent decision makers as are adults.

Results from other laboratory studies of adolescents' decision-making competence are somewhat mixed. Klayman (1985) examined the performance of 12 year-olds in a multiattribute decision problem (selecting among bicycles varying on a number of different attributes). He found that they already had a systematic approach to making a choice, manifesting compensation, satisficing, contingency and elimination, multipass searches, and modification of strategy in response to task complexity. Their general approach and strategies were similar to those that have been found in adults' problem solving.

In another empirical study, Ross (1981b) assessed adolescents' skills in making decisions about six different issues (drinking, smoking, shoplifting, copying homework, career choice, and leisure pursuits). Although he did not compare their performance with that of adults, Ross found very little difference between 7th and 10th graders in the skills of identifying alternative courses of action, selecting appropriate criteria (for consequences), assessing alternatives by criteria, summarizing information about criteria, and self-education. This suggests that at least these skills are not improving across the early adolescent years. On the other hand, Harmoni et al. (1987) reviewed empirical work related to

adolescent decision-making skills and concluded that young adolescents (12-14 years) are less able than older adolescents and adults to create options, identify risks and benefits, and gauge the credibility of information.

Several other studies also suggest deficits in adolescents' decision-making skills. Lewis (1981) presented 7th-8th graders, 10th graders, and 12th graders with hypothetical dilemmas and asked them what they would suggest another kid should think about when making a decision about what to do. She found a significant increase, in the spontaneous mention of risks (i.e., possible losses) with increasing age, suggesting that younger adolescents may be likely to overlook the possible negative consequences of options. Reyna, Woodruff and Brainert (1987) found that adolescents may be more overly impressed by single case histories when estimating probabilities than are adults. If this finding is robust, we might expect adolescents' decision making to reflect more inaccurate probability estimates than that of adults.

In summary, these few studies give a picture of mixed results with respect to adolescent decision-making competence. The variety of empirical methods used and criteria selected for assessing competence may partially explain this ambiguous state of affairs. Clearly, a more systematic examination of competence in each of the steps of the decision-making process is needed. More specifically, we need to ask: (a) Do adults and adolescents differ in their ability to consider all the relevant options?; (b) Do they differ in their ability to think of possible consequences of those

options?; (c) Do they differ in the accuracy of their judgments about the probability of occurrence of each possible consequence?'; (d) Do they differ in their ability to accurately assess the value of each possible consequence to the decision maker?; (e) Do they differ in their ability to combine this information in a way that maximizes the decision maker's well-being? For some of these questions there is considerable empirical evidence concerning the performance of adults (Fischhoff, 1988), but there is virtually no empirical evidence comparing adolescents to adults.

2. Adolescents take more risks than do adults, and their risk taking endangers their well-being. Adults accuse adolescents of undue risk taking because adults see such things as drug use, pregnancies, and drunk driving among adolescents. Indeed, 16-24 year-olds account for 58% of all fatalities to drivers, but for only 21% of licensed drivers (Jonah, 1986). The disproportionate number of casualty accidents in this age range obtains even when one controls for the quantity and quality of exposure to risk (e.g., total miles driven, time of day) (Cameron, 1982). More than 50% of young drivers report that they drink and drive even though just 1-2 drinks more than double one's chances of an accident (Phelps, 1987). Nearly one-third of sexually active 15-19 year-olds report never using contraceptives (Zabin, 1980). All of this suggests that teenagers are relatively willing to take risks.

However, to establish whether adolescents actually take more or greater risks than adults do, it is not enough to know that adolescents engage in certain behaviors which appear to have

possible negative outcomes. The decision-making perspective reminds us that we also need to know how adolescents and adults judge the possible consequences of the various options in a given decision situation. Thus, for example, although a number of studies have found that young drivers drive faster and with less safety margin than older drivers do, one need not agree with Jonah's (1986) conclusion that "these studies unequivocally support the contention that young drivers take greater risk by driving faster than older drivers" (p. 259). One would need to know (a) how each of these age groups values the possible consequences of driving fast--both negative consequences (e.g., having an accident) and positive ones (e.g., getting somewhere on time, impressing one's friends)--and (b) how they value the possible consequences of driving slowly.[3]

Consequence perception may also be important to understanding individual differences in risk-taking behavior. Individuals may differ in how much they see themselves as having to lose and to gain, with those who engage in seemingly very risky behavior having less to lose and more to gain by doing so than those who do not engage in that behavior. For example, some teenage girls may see themselves as having little to lose by becoming pregnant--their school experience may be very unrewarding and their career opportunities very unattractive. In that case, they may not feel that they are jeopardizing educational goals or a fulfilling and lucrative career by having a child. Abrahamse et al. (1988) reported that high school girls who seemed to have the most to lose

in terms of educational opportunities if they were to become single mothers were the least likely to say they would consider having a non-marital birth. Other girls may feel that they have much to gain by becoming pregnant--the satisfaction of being needed by and nurturing a child, perhaps a stronger commitment from the child's father, and even establishing one's own independence and family unit.

Individual differences in drug use may have analogous explanations. For example, some teenage boys may see themselves as having little to lose by taking drugs regularly--their interactions with parents may be infrequent and unfulfilling (parents being absorbed in their own careers, cocktail parties, divorces, etc.), they may find the prospect of following in parental footsteps painful, and they may find the societal destruction of the environment and threat of destruction of the planet to be both alienating and depressing. In that case, they may not feel that they are jeopardizing meaningful and fulfilling experiences (now or in the future) by taking drugs. And, they may feel that they have much to gain by taking them--relief from the pain and alienation that they feel.

To date, only a few studies have tackled even some of these issues, and those few have focused on the role of consequence probability and value judgments in determining adolescents' choices regarding decisions about drug, alcohol or tobacco use and sexual behavior. We will describe these studies in some detail, since they represent the only empirical attempts to apply a decision-

making perspective to adolescent risk taking.

Bauman (1980) pioneered this kind of work with his study of 7th graders' perceptions of how likely they thought 54 different consequences were to occur (on a 5-point scale) if they used marijuana, and their evaluations of the importance to them (on a 5-point scale) of those consequences that they thought might occur. The most "salient" positive consequences (those for which a large number of respondents gave relatively high probability and importance ratings) tended to be things bringing direct and immediate psychological and physical satisfaction (e.g., worry less, feel happier, be less bored), and did not include some of the "frequent explanations of drug use" (p. 114) such as being more liked by friends, feeling more grown-up, and feeling closer to others. These results suggest that those consequences which are determining adolescent marijuana use may not be the ones that adults tend to think influence adolescents' decisions the most. If so, there are important implications for interventions designed to reduce drug use, as argued cogently in a recent article on a new drug bill:

> Permeating the anti-drug materials that flood the schools is the idea that teens take drugs and get drunk to please their peers or get their parents' attention. Rarely, if ever, will you find a hint of the truth: people take drugs because drugs feel good . . . Just about every teenager in America, through either personal experience or the testimony of peers, knows that taking drugs can be fun. We're not suggesting that high school teachers stress this point. But any source of information that actively denies it won't maintain its credibility for long, and may do more harm than good (The New Republic, No. 14, 1988).

Of course, identifying which consequences play the most important role in determining teens' decisions about marijuana use requires more than just knowing which ones they explicitly rate as important. We must also know how well those ratings predict actual marijuana use. Bauman examined this issue by calculating a "utility structure index" for each of his respondents who reported never having used marijuana at the time of initial data collection. That index consisted of the sum (across all 54 consequences) of each consequence's importance rating multiplied by its probability rating and weighted by a factor reflecting the degree to which the consequence is immediate or delayed. Bauman then examined how well this index predicted reported marijuana use one year later. A relatively large percentage of individuals with very high utility structure index scores reported having used marijuana one year later, and a very low percentage of individuals with very low index scores reported having used it. However, for well over half the respondents (those with a very wide range of intermediate scores), there was little relation between their index scores and whether or not they had used marijuana. Overall, only about 20% of the variance in reported marijuana use was predicted by the index scores.

The fact that judgments of the probabilities and desirabilities of various possible consequences of smoking marijuana did not predict reported behavior very well in Bauman's study might be interpreted as questioning the importance of those two factors in determining choices about marijuana use. However,

a decision involves at least two options. One's choice is typically (and normatively should be) determined by characteristics of the possible consequences associated with both (or all) options. For example, the social consequences of not smoking might be perceived as very undesirable and highly probable, and as a result they may be more highly predictive of the choice made than any of the desirable or undesirable consequences of smoking. Bauman's study cannot test this possibility, since respondents were not asked to rate the desirability and probability of possible consequences of not smoking. A similar limitation applies to most of the studies that have attempted to examine the degree to which judgments about possible consequences can predict choices. More generally, as long as a study does not include all relevant components in the decision theoretic formulation, it cannot adequately test the role of any one component in determining choices.

Another limitation of Bauman's study is the lack of correspondence between the decision components measured and the decision itself. His decision measure was whether an individual reports having ever used marijuana. However, most 7th graders have probably not make a decision about whether to ever use marijuana. Rather, whether or not they have ever used it is quite likely to be the result of having made a decision about whether to smoke a joint in several (or even numerous) specific situations. A decision theoretic analysis of the role of perceived consequences in determining those several choices would therefore require

measurement of the perceived consequences in those specific situations. However, in Bauman's study, the decision situation was completely unspecified when consequence judgments were elicited, being described only as "if you used marijuana."

Bauman and his colleagues have examined cigarette smoking among ninth graders in a similar fashion (Bauman et al., 1984; Bauman et al., in press; Bauman & Foshee, 1988). Here, too, the utility index based on consequence judgments did not predict reported cigarette smoking very well. However, this study is subject to the same limitation as their marijuana use work, namely that the consequences of not smoking cigarettes were not included in the study.

Urberg and Robbins (1981) also examined adolescents' evaluations of the possible consequences of smoking. They had 12-15 year-olds rate 19 negative and 15 positive consequences on their importance to them "when considering whether or not to smoke" (using a 4-point scale). They found that smokers rated the same number of benefits but fewer costs as "important" or "very important" than did nonsmokers. Of course, it is hard to know whether the lesser importance of negative consequences to smokers accounts for their decision to smoke, or whether it helps them to rationalize the fact that they smoke. Among nonsmokers, Urberg and Robbins found that those who felt sure that they would not smoke in the coming year rated more costs of smoking as important or very important than did those who intended to smoke or who were not sure if they would. So again, a lesser importance attributed to

possible negative consequences seems to be associated with a decision to smoke. In addition, however, those who were sure that they would not smoke in the coming year rated fewer benefits of smoking as important than did the others, suggesting that the importance attributed to possible benefits of smoking also plays a role in young adolescents' decisions whether or not to smoke.

Bauman and his colleagues have also tried to predict alcohol consumption from judgments about the possible consequences of drinking (Bauman & Bryan, 1983; Bauman et al., 1985). Correlations between several measures of drinking behavior and the utility index based on consequence judgments were significant but their magnitudes were quite small (.15-.33). Again, this may not be surprising, given that judgments about the consequences of not drinking were not included in the utility index. Barnes (1981) also examined alcohol drinking, asking both 7th graders and adults to rate reasons for drinking alcohol on a 4-point scale of importance to them. Although "reasons for" are not always directly translatable into consequences (e.g., "because I've been told not to drink"), they often are (e.g., "it makes me feel good," "it helps to get my mind off my problems"). Barnes found that reasons related to "perceived conforming" and "status transformation" (e.g., "so I won't be different from the rest of my friends," "it's one way of being part of the group," "it's part of becoming an adult") were not endorsed by many 7th graders or adults, while items dealing with psychological and physical satisfaction (e.g., "it makes me feel good," "it tastes good," "to have a good time")

were the most highly endorsed. This pattern of results is similar to that of Bauman (1980) regarding marijuana use. However, Barnes asked also about reasons for not drinking. The ratings of importance of reasons for drinking, combined with ratings of importance of reasons for not drinking, accounted for less than 10% of the variance in self-reported drinking behavior for both 7th graders and adults. Thus, if these measures are valid, and if all relevant consequences were included, it appears that the judged importance of consequences is not a major determinant of these adolescents' or adults' drinking decisions (. . . but those are big if's).

Finally, several studies have examined the role of consequence evaluation in decisions regarding sexual intercourse. Bauman and Udry (1981) had 307 7th-9th graders rate both the probability (on a 5-point scale) and the desirability (on a 4-point scale) of 17 possible consequences of engaging in sexual intercourse. The sum of the products of these two measures was then used to predict (a) whether an individual reported ever having had intercourse, and (b) an individual's score on a 12-point scale of "progressively intimate interaction." Prediction correlations ranged from .22 to .57 (depending on race and gender). One difficulty in interpreting these results is that it is impossible to determine the direction of the effect (i.e., did an individual engage in intercourse because of the expected effects, or does the individual expect different effects depending on whether or not s/he has engaged in intercourse?). An additional limitation of this study, of course,

is that it did not include judgments about the consequences of not engaging in sexual intercourse. Gilbert, Bauman & Udry (1986) did a similar study (using a subset of Bauman and Udry's consequence list) with three-year longitudinal data. It was found that the utility index had a very small correlation with subsequent reported sexual behavior, accounting for only 2% of the variance. Again, the criterion variable (sexual behavior) was measured rather crudely, by answers to the question: "Have you ever had sexual intercourse?"

In sum, what little evidence there is (with all its mentioned weaknesses) suggests that to at least some small extent teens choose to engage in behaviors which are more likely to bring consequences they perceive as positive and less likely to bring consequences they perceive as negative. Thus, the existing evidence does not support the contention that adolescents are prone to "irrational" risky behavior (i.e., behavior which they see as more likely to diminish their well-being than to improve it). If they engage in behaviors which are not advised by adults, one plausible explanation would be that adolescents evaluate the importance of all the various possible consequences of the options in question and/or the relative likelihoods of those consequences, differently than do adults. However, to adequately examine this possibility, much improved empirical work is needed comparing adolescent and adult perception of consequences.

One additional source of information on the degree to which adolescents consider possible consequences in choosing among

options involving risk can be found in the criminology literature on deterrence theory. The theory claims that a person will choose the option of not committing a criminal act if the possible negative outcomes of that act are perceived as very probable and/or very undesirable. However, there is generally little empirical support for either perceived severity or perceived certainty of punishment as a determinant of criminal behavior. This result may be explained by the finding of recent reviews that there are many methodological flaws in empirical tests of deterrence theory (e.g., Williams & Hawkins, 1986). In addition, much of the work has been done with college students, whose perceptions of sanctions may be relatively unstable due to circumstances unique to their living situation. Furthermore, the choice of a criminal act is probably not only the result of possible negative outcomes, but also of possible positive outcomes, and the possible consequences (negative as well as positive) of the alternative options, whatever they may be. Mulvey and Aber (in press) suggest that delinquents (at least the most active ones) just assume they'll have to do time at some point, so they may even ignore the probability of negative consequences in deciding whether to engage in criminal behavior, and focus more on positive outcomes. Indeed, Williams and Hawkins (1986) report that a number of studies have found a significant correlation between perceived reward of crime and likelihood of criminal behavior. The possibility that delinquents focus more on positive outcomes is compatible with Lopes' (1987) suggestion (described below) that those who take the greatest risks may focus

their attention on the opportunity for gain, and neglect to attend to avoiding loss (even though aware of the possible loss); those who take fewer risks (given the same subjective values for the gains and losses) may attend relatively more to avoiding loss.

Two final comments with respect to adults' views of adolescents' undue risk taking are worth noting. One is that adults may view adolescents as risk takers because adults observe adolescents to be taking greater risks than adults themselves take in similar situations (e.g., with respect to sexual behavior, drinking alcohol). One reason might be that adolescents make more decisions in which severe outcomes play a role. For example, the consequence of an unwanted pregnancy (after engaging in sexual intercourse) may be considered a much less negative event by a married woman who has several children already than it is by an unmarried adolescent still in high school. In other words, sexual intimacy decisions may entail consequences which have larger negative values for adolescents than they do for adults (even if the consequence probabilities are the same for both groups). The same may be true for decisions on a number of other issues, since in many ways adults may have better resources for dealing with things that go wrong and for recovering from them.

The other final point here is that, even if adolescents knowingly take more risks than adults deem advisable, it is not clear that adolescents are endangering inordinately their well-being any more than adults are. Baumrind (1983) argues forcefully that "many forms of risk-seeking behavior during adolescence are

developmentally normative and adaptive," and are necessary for developing the positive characteristics of autonomy and social responsibility. Risk taking and its associated "eustress-seeking" (i.e., pursuing opportunities for challenge and fulfillment) entail secondary gains, according to Baumrind, which include "euphoria, self-esteem and self-confidence, increased stress tolerance, initiative, and achievement" (p. 3-4). Furthermore, she argues that some risk-avoiding behaviors in adolescence can threaten well-being as much or more than risk-taking ones!

3. Adolescents do not consider sufficiently those possible consequences (of various options) that might occur in the distant future. A number of empirical studies (reviewed by Greene, 1986) have reported that older adolescents (as compared to younger adolescents and children): "(1) demonstrate greater depth and extension of temporal perspective . . . ; (2) project a more complex, differentiated set of future expectations . . . ; and (3) describe future aspirations with greater planfulness, organization, and realism" (p. 100). This suggests that at least younger adolescents may be less likely than adults to take into account the full set of possible consequences in the distant future when making decisions. If the future consequences are also the most negative ones (e.g., dying from cancer because of smoking), then we might expect adolescents to engage in risky behaviors more than they would if they considered those consequences (and more than adults think they should). However, Greene (1986) found the empirical results regarding future time perspective to be mixed, differing

by gender and socioeconomic status, and several studies even have found older adolescents to be less future-oriented than younger ones. Moreover, he found no empirical relation between future time perspective and the development of formal operations (as Piagian theory claims there should be).

Much of the empirical evidence about time perspective is based on studies that ask adolescents to list as many things as they can that will happen in the future, or to define when "the distant future" is. One study (Lewis, 1981) reported a significant increase across grades 7 to 12 in the spontaneous mention of future consequences or implications of different options in a decision, but no study has examined the degree to which adolescents (as compared to adults) actually take into account future consequences (especially distant future ones) in making decisions. Thus, the assertion that adolescents do not consider sufficiently possible consequences in the distant future remains an interesting hypothesis for which there are yet no convincing data one way or the other. However, there is good empirical evidence (reviewed by Baumeister & Scher, 1988) that <u>adults</u> often display "self-defeating" behavior by "choosing immediate benefits, such as pleasure and relief, despite long-term costs of increased harm, loss or risk" (p. 12). Thus, perhaps the interesting question is whether adolescents fail to consider possible consequences in the distant future any more than do adults.

From a decision-making perspective, possible future outcomes could be treated differently by adults and adolescents, even if

both recognize the same set of possibilities. Specifically, it may be that adolescents judge some negative consequences in the distant future to be of lower probability than do adults or to be of less importance than adults do. However, there are no empirical data relevant to these possibilities.

4. Adolescents think that they are invulnerable. At least as far back as Aristotle, adolescents have been viewed as possessing an unrealistic confidence in their own safety: "The young . . . are full of passion, which excludes fear; and of hope, which inspires confidence" (cited in Welldon, 1966, p. 166). A theoretical basis for such feelings of invulnerability has been proposed by Elkind (1967) who argues that an adolescent entertains a "personal fable," which includes a belief in one's indestructibility. However, there is little empirical evidence for the personal fable construct (Lapsley et al., 1986).

In decision-making terms, adults' criticism of adolescents' apparent feelings of "invulnerability" (e.g., Hamburg in Goleman, no date; Irwin & Millstein, 1986) seems to reflect a belief that adolescent risk taking is due to either (a) neglecting to recognize possible negative outcomes of a given behavior, or (b) underestimating the likelihood of those that they do recognize. However, empirical evidence is weak. Neglecting to recognize possible negative outcomes might be expected from adolescents due to their more limited real world experience (what Irwin & Millstein (1986) call "inexperienced cognition"). It might also be expected if the negative outcomes of so-called "risky behaviors" tend to be

things which would materialize only in the distant future and if adolescents tend to ignore future consequences. However, we saw above that there is little empirical evidence on this issue.

The second factor that might result in adolescents feeling invulnerable, namely that they may underestimate the probability of possible negative consequences, has received somewhat more empirical attention. In a widely cited article, Cvetkovich et al. (1975) refer to several studies which they claim show that many adolescents tend to think that they cannot get pregnant, but quantitative results are not presented. Morrison's (1985) summary of a dozen studies on this issue concludes that, "At least a third, and frequently more than half, of sexually active adolescents cite versions of 'I thought I (or my partner) couldn't get pregnant' as a reason they did not use contraception" (p. 553). However, at least one large study has obtained the opposite result. Namerow et al. (1987) found that of 425 adolescent girls attending The Door program in New York City, more of them (about one-third) thought that their chances of getting pregnant were "virtually certain" than were actually at high risk (about one quarter) according to the timing of their last sexual encounter within the menstrual cycle. Similarly, Luker (1975) found that in her study of 500 women seen at an abortion clinic, more women considered themselves to be taking pregnancy risks than she included in her objective definition of risk takers. However, only about one-third of her sample were teenagers, and her data are not presented separately for different ages.

Benthin (1988) asked 14-18 year-olds to rate the extent to which (a) they themselves, and (b) some other person their age would be at risk of getting hurt or sick if they engaged in each of 30 risky activities. Given that the overall means were virtually identical for these two measures, and that their correlation was .99, these teenagers apparently do not tend to see themselves as any less vulnerable than they see their peers. This study did not, however, examine whether teenagers see their entire age group as less vulnerable than other age groups. One study that did (Finn & Bragg, 1986) found that male drivers 18-24 years of age perceived their chance of being in an accident to be significantly lower than that of 38-50 year-olds. In contrast to Benthin's study, Finn and Bragg also found that individuals in the younger age group saw their own chance of being in an accident to be less than that of their peers, whereas individuals in the older age group saw their own chance to be comparable to that of their peers. This suggests that older adolescents and young adults are more likely than older adults to view themselves as uniquely invulnerable.

The mixed results on feelings of invulnerability reviewed here may well reflect methodological problems with some studies such as (a) imprecise scales used to measure perceived probabilities (e.g., scale point labels such as "somewhat likely"), (b) sample selection inadequacies (e.g., many studies use only girls who are seeking contraceptives for the first time, or who are already pregnant--both of those groups may feel they need to justify why they weren't

using contraceptives before), and (c) lack of information on perceived base rates of engaging in risky behaviors (e.g., Burger & Burns' (1988) conclusion that sexually active college women are operating under an illusion of unique invulnerability if they see themselves as less likely to become pregnant than other college students does not take into account the possibility that those same women might see themselves as less sexually active than the average college student).

Clearly, we need more empirical work to establish the degree to which adolescents feel unrealistically invulnerable to negative outcomes, and also to test whether they are any more susceptible to this judgment error than are adults. Considerable research has shown college students to be unrealistically optimistic about future events (Weinstein, 1980), and adults in general to see themselves as less likely than other adults to suffer health problems related to alcoholism and venereal disease, and as less likely to have serious car accidents (Snyder, in press). Thus, invulnerability feelings are actually better established in the literature with adults than with adolescents.

With respect to the role of adolescents' judgments about both the likelihood and desirability of possible consequences to the options being considered, it has been argued that providing adolescents with information about the likelihood and magnitude of negative consequences from such activities as smoking, taking drugs, and drinking and driving, has no effect on their risk related decision making (Cvetkovich et al., 1988; Jessor, 1985).

However, this conventional wisdom in the literature comes principally from studies of self-reported behavior; the validity of such studies has yet to be proven (Biglan, 1988). Furthermore, a recent study by Bachman et al. (1988) claims that the significant decline in reported marijuana use by high school seniors during the 1970's and 1980's can be accounted for by a large increase in perceived risks and/or in disapproval of use. They argue that perceptions of risk have direct effects on use, as well as indirect effects via disapproval of use, and that changes in information about marijuana have led to a secular trend of perceptions of increased risk, which in turn has led to secular trends in increased disapproval and in reduced marijuana use. Finally, they suggest that the conventional wisdom that information alone does not influence drug use stems from the fact that early efforts to dissuade people from marijuana use made exaggerated claims about harmful effects, and people could readily observe that they weren't true. These authors claim that the more balanced reports of recent years, along with people's observations of very real deficits among regular using acquaintances, have affected both attitudes and use.

5. Adolescents let emotions rule their choices. Another belief sometimes expressed is that adolescents are "too emotional" in their decision making. Although it is not entirely clear what "emotional decision making means, there seems to be an implied contrast with more reasoned decision making, where the latter refers to a careful weighing of possible pros and cons of all feasible options. Making "emotional" decisions seems to mean

acting impulsively before thoroughly considering the possible consequences of all relevant alternatives.

Such "short-circuited" decision making might result when highly valenced outcomes capture one's attention and motivate one to act without further deliberation. Or, it may result under conditions of stress, which have been shown to shorten the decision-making process in some studies (Keinan, 1987; Keinan, Friedland & Ben-Porat, 1987)--though not in all (see Messer, 1970) --and to result in maladaptive patterns for coping with decision making (Janis & Mann, 1977). Thus, one might hypothesize that it is more likely (a) for adolescents than for adults to have highly valenced outcomes (e.g., the extreme importance of peer approval, or of self-esteem), or (b) for adolescents to be experiencing stress (e.g., due to the particular challenges they face resulting from rapid biological changes and entry into a new role status and social system (Hamburg, 1974)). If true, either of these possibilities might result in more emotional decision making among adolescents. However, whether adolescent decision making is indeed more emotional than that of adults, and if so what accounts for it, remains to be established empirically.

6. Adolescents rely heavily on peer information and attitudes when making decisions about risky behavior. There is a relatively widespread belief in our society that adolescents ignore advice from adults and, instead, listen and conform to their peers. Relevant empirical work includes laboratory evidence that conformity peeks at early adolescence (see Lewis, 1979, for a

review). However, studies of real-life decision making question the degree to which adolescents are more peer-conforming than other ages. Levenson et al. (1986) found that adults think that adolescents rely on peers for health information more than adolescents say they do. Similarly, Poole and Gelder (no date) report that 13-15 year-old Australians say that their parents influence their opinions (on mostly family related decisions) far more than their peers do. The latter result may depend on the content area of the decision. Brittain (cited in Lewis, 1979) found that adolescents claim they go along with what peers (as opposed to parents) think regarding "less important" or present-oriented things like clothing decisions, but claim to be more influenced by what parents think regarding future-oriented decisions. Although one study (O'Brien & Bierman, 1988) found that peer group acceptance/rejection was reported to be a more important determinant of self-esteem by adolescents than by younger age levels, when asked the degree to which they are influenced by their friends to do each of 30 risky behaviors, Benthin's (1988) sample of 14-18 year-olds reported only very minor peer influence.

In sum, adolescents may care very much what their peers think of them, but that apparently does not necessarily mean that their decisions about engaging in risky behaviors are heavily influenced by peers. In most studies, perception of influence has been measured, but actual influence on behavior has not been assessed. Furthermore, the emphasis has usually been on whose advice adolescents <u>follow</u>. However, they might not necessarily <u>seek</u> that

advice. There is some evidence that adolescents are more likely to follow the advice of parents even on topics for which they are more likely to seek the advice of peers (Brittain, cited in Lewis, 1979). "The myth of the adolescent peer culture" (Elkin & Wesley, 1955) may be operating to some extent in our beliefs about peer influence on adolescents' risk-taking decisions.

If information that the adolescent receives from peer sources differs from information received from adults, then, from a decision-making perspective, the relative influence of these two sources could determine the particular alternatives the adolescent considers, the possible consequences of which s/he is aware, and/or the adolescent's assessments of the likelihood of those consequences occurring and of their desirability. Additionally, if the information is presented in the form of simply what to do (without mention of consequence likelihoods and desirabilities), and the adolescent's decision rule includes taking such categorical advice into account, then yet another way risk taking might be influenced differently by different information from peers and adults is by directly determining different final choices in decision making. Only detailed empirical studies of the steps involved in adolescent decision making will permit us to clarify the degree to which adolescents rely on peers and the degree to which they rely on other sources of information and influence when making decisions about risky behavior.

Implications of the Decision-Making Perspective for Education and Intervention

Research conducted from a decision-making perspective will permit us to establish the relative validity of each of the two following possibilities regarding adolescent risk taking:

1. One possibility is that individual decisions to engage in risky behaviors such as taking drugs, having sex without contraceptives, and dropping out of high school are often rational choices in the individual's own best interests, given the existing conditions and contingencies. If this is true, it seems unwise to try to change anything about individuals' decision making. Indeed, that might not even be possible, given that it could require changing from rational to irrational choices. Rather, it would seem to make more sense to focus efforts on altering the conditions and contingencies surrounding the adolescent such that rational decision making would result in fewer unduly risky choices. If, for example, getting pregnant is relatively more attractive to a teenager than her schooling or employment options, then perhaps something needs to be done about improving the quality of the schooling and/or job opportunities available to her.

2. Another possibility is that individual decisions to engage in some risky behaviors are not rational, given the existing conditions and contingencies, and thus decision-making skills should be improved so that more rational choices will be made. Of course, more rational choices will not necessarily be ones which risk smaller losses; one criterion for rationality is maximizing

one's well-being, and it may sometimes be necessary to risk larger losses to do that.

Two different traditions in the field of public health regarding education and intervention correspond to these two possibilities. The health promotion tradition assumes that individuals sometimes make poor decisions and need to be encouraged to make different choices. Advocates of this position promote healthy individual lifestyles, hoping to convince individuals to choose these lifestyles for themselves.

The other tradition is health protection. Its emphasis has been on reducing exposure to causal agents by changing the environment. It assumes that individuals typically make rational choices, and thus it encourages social structural changes that make health generating choices more likely. "Historically, health protection strategies have proven to be the more effective public health measure . . . [but] also the most controversial and subject to the greatest resistance from vested interests" (Wallack & Wallerstein, 1986-1987, p. 322). This can be seen with respect to smoking behavior where health promotion strategies such as asking adolescents to decide not to smoke "in the face of sophisticated advertising and social pressure" have been relatively ineffective (Ratcliffe & Wallack, 1985-1986, p. 220). It is also reflected in the tobacco industry's resistance to health protection strategies such as placing health warnings on cigarette packages or banning cigarette advertising (presumably because they know these might be far more effective in reducing the number of adolescents who smoke

cigarettes than would be individual decision-making training). Indeed, individual risk taking cannot be isolated from the broader social context and risk-imposing factors in one's environment (Ratcliffe & Wallack, 1986). The fact that the same government which wants adolescents to not smoke also subsidizes the tobacco industry exemplifies the contradictions which can develop if the "health protection" perspective is neglected in favor of a focus on health promotion.

This distinction in approaches is relevant to adolescent pregnancy as well. A recent study of 37 countries showed that those countries with the most liberal attitudes toward sexuality, the most accessible contraceptive services for teenagers, and the most effective sex education programs had the lowest rates of teenage pregnancy (Jones et al., 1985). This suggests that environmental interventions with respect to these characteristics might be effective in reducing teenage pregnancy. However, contraceptive services for teenagers and sex education programs have met with resistance from various segments of our society, often in favor of an emphasis on individuals' choices in the form of trying to simply persuade teenagers to make different choices with respect to contraceptive use and/or sexual intercourse. In this vein, Repucci (1987) points out that:

> Society's role in these [teenage] pregnancies, or fertility 'mistakes,' is rarely addressed since it is generally considered the responsibility of any sexually active individual to contracept competently. Yet individual-focused research has not adequately explained why contraceptive nonuse is so flagrant among teen-agers who have adequate knowledge and access to contraceptives and do not display abnormal patterns of behavior in other aspects of their lives, nor has

it generated adequate prevention methods (p. 4).

In an attempt to address these issues, Repucci argues that adolescents receive very contradictory messages about sexuality.

> Although adults in these settings [the home, school, church, and community] may convey a sense of disapproval of sexual activity for teen-agers, mass media is a potential influence that reflects a confusing set of values . . . listen to the lyrics of popular songs or attend almost any recent teen-age movies . . . Sexuality is exploited flagrantly . . . Presently, with the focus of media and literature on the epidemic of adolescent pregnancy rather than the ecological phenomena that are so integrally related to it, we have been distracted from some of the key issues that create and maintain this social problem (p. 6-7).

Repucci argues that, perhaps surprisingly, attempts to discourage sexual activity among teenagers may actually result in more adolescent pregnancies:

> It appears that guilt does not prevent sexual intercourse, but instead discourages contraception because the latter would represent double deviance--sexual intercourse with premediation (Fox, 1977). This conceptualization suggests that protection programs might be developed to help adolescents accept their sexuality (i.e., a "liberal" attitude toward sexuality, sex education programs, contraceptive services). However, fear exists that such programs may communicate approval of sexual activity and thus generate strong public opposition. From this perspective, it can be argued that moral conflicts at the societal level restrict preventive interventions to resolve the moral conflicts of individual adolescents, and this may be partly responsible for contraceptive nonuse and adolescent pregnancy (p. 5).

The distinction between health promotion and health protection approaches is important for understanding <u>drug use</u> as well. Health promotion approaches advocate persuading adolescents to "just say no," whereas health protection approaches emphasize the necessity of ameliorating those conditions which lead adolescents to choose drug use. For example, several recent studies show a positive

correlation between sexual abuse and drug use among adolescents (Dembo et al., 1987; Rohsenow et al., 1988), suggesting that perhaps a sensible (and more humane) way to reduce drug use is to eliminate sexual abuse, rather than to simply encourage abused kids to resist drugs as a solace to their pain.

Similarly, we should not be surprised if we are not very effective at convincing kids to stay in school, when on recent report indicates that 66% of high school dropouts are due to disliking school, getting pregnant, or wanting/needing to work (Rumberger, 1987). Preventing dropout may require doing something about these causes, such as making school a more positive experience, improving the socioeconomic status of potential dropouts and their families, making it easier for girls not to get pregnant if they do not want to (see also Fine, 1986).

Thus, the health protection perspective assumes that adolescents make rational choices (which sometimes are not the choices adults wish they would make) and that to change those choices (while maintaining rationality), some of the defining elements of the decision faced would have to change.

To the degree that adolescents' decision making proves to be less than rational, interventions designed to improve individual decision making may be called for. Although specific inadequacies in adolescents' risk-related decisions have not yet been adequately documented, there has been a proliferation of curricula designed to teach decision making to young people (e.g., Bergland et al, 1975; Herrnstein et al., 1986; Mann et al., in press; Ross, 1981a;

Russell & Roberts, 1979; Schinke, 1982). Elsewhere we (Beyth-Marom, Fischhoff, Jacobs & Furby, in press) have reviewed these programs in some detail. Generally speaking, the programs cover the prescriptive steps to good decision making fairly well, while largely ignoring the descriptive research into how people intuitively make judgments and decisions. Although several curricula report success in improving decision-making skills, most evaluations are limited to assessing participants' knowledge about what investigators consider to be optimal decision making. The few that examine actual decisions usually rely on either paper-and-pencil responses to hypothetical decision situations, or on verbal reports of real-life decisions e.g., self-report of drug use), rather than obtaining measures of actual behavior (e.g., urine tests). As a result, it is hard to know whether any of these programs actually change the way adolescents make decisions (and if so, whether the change is for the better).

By way of comparison, attempts to train decision making with adults are also difficult to evaluate. In his comprehensive review, Adsit (1987) concludes that teaching adults (a) to think systematically about ill-defined problems ("multiphase training") and (b) to use domain specific heuristics seems to be effective, but it is not known how generalizable the effects are. Training in domain-independent heuristics has met with more limited success. Here, as with decision-making training with adolescents, efforts have often been "fragmented and somewhat haphazard" (p. 90), lacking both theoretical underpinnings and sound empirical

evaluation. Thus, to the extent that decision making among both adults and adolescents may be less than optimal, it remains unclear whether remedial instruction can have any generalizable, lasting effects in improving decision making.

On the Need for a Developmental Theory of Decision Making

Both the limited state of our knowledge about adolescents' competence in making decisions about "risky behaviors," and the weak theoretical background in the attempts to train decision-making skills, suggest the need for a developmental theory of decision making. Such a theory would: (a) provide a sound basis for empirical studies designed to assess competence in specific components of the decision-making process, in the interests of providing a systematic and comprehensive account of adolescents' skills in comparison to those of both young children and adults; and (b) provide an analytic framework and rationale for designing decision-making curricula which maximize the chances of successfully teaching generalized decision skills.

A developmental theory of decision making needs to address a variety of questions related to decision-making competence. These include:

1. What are the criteria for good decision making? In order to identify the skills needed for good decision making, we need to be able to distinguish good decision making from bad, and to define competence with respect to decision making.

One possible criterion of good decision making is the maximization of subjective expected utility. Such a criterion focuses on the consequences of the chosen option, comparing their probabilities and values to those of all other options (as perceived by the decision maker). One difficulty with this criterion is that it may be hard to assess, since it requires accurate measurements of people's values and probability perceptions. As described above, studies that have examined the relation between components of subjective expected utility and decision choices have generally found fairly low correlations (e.g., Bauman, 1980; Bauman & Udry, 1981; Cimler & Beach, 1981; Gilbert et al., 1986). However, it is hard to know whether the low correlations reflect an inability to maximize utilities on the part of adolescents, or whether they reflect researchers' in ability to measure accurately all the relevant values and probabilities.

Another approach, exemplified by Harmoni et al. (1987), is more process oriented. According to this criterion, good decision making is that which follows some normatively "best" process for arriving at a choice. From a review of the literature and an analysis of the decision-making process, Harmoni et al. propose the following dimensions for judging quality of the decision-making process: willingness to make a choice, creating options, identifying risks and benefits, gauging the credibility of sources, metacognitive understanding of decision making, creative problem solving, ability to accept compromise solutions, commitment to a course of action, correctness of choice, and reliability of choice.

Harmoni et al. have used these criteria both to review the evidence of adolescents' competence and to develop a curriculum for improving those skills. While this is definitely a step in the right direction, the utility of their particular formulation will depend on the degree to which they can provide more precise definitions of these criteria, and whether the importance of each of the criteria can be validated empirically. It is not obvious, for example, that a metacognitive understanding of decision making is necessary, or even helpful for good decision making.

2. <u>What specific skills are required for good decision making?</u> Performing any one of the steps involved in decision making requires a whole host of abilities. There is not doubt that decision making is a higher order mental ability which is based on numerous cognitive abilities. Some of those are general, applicable to many cognitive tasks (e.g., divergent thought, fluency, and resistance to closure); others are more specific, applicable mainly in a decision-making task (e.g., accurate assessment of consequence probabilities). No doubt, affective skills (e.g., emotional control) and behavioral skills (e.g., the ability to inhibit an immediately salient response such as saying 'yes' to a peer's invitation to take drugs, so as to deliberate about alternative courses of action and their probable consequences before selecting one) are also needed for effective decision making. An analytic and empirical effort to specify the skills needed for good decision making is badly needed.[4]

3. <u>What is known about the developmental acquisition of these skills?</u> Acquisition may depend <u>both</u> on cognitive structural characteristics at a given point in time and on the opportunities which experience has provided for acquiring given skills. We presently know a considerable amount about the former from the cognitive development literature. It is generally believed, for example, that it is during adolescence that one acquires the abilities to (a) think abstractly, (b) think hypothetically, (c) use combinational reasoning, and (d) make hypothetical deductions (Keating, no date). Thus, to the extent that these abilities are necessary for optimal decision making, we might expect younger adolescents to be somewhat deficient in decision making.

Less is known about the developmental acquisition of more specific skills such as numerical estimation (e.g., of frequencies and probabilities), combining information from several sources, or judging cumulative risk (e.g., across multiple occasions), all skills which have been studied with adults and for which deficits have been found (e.g., neglect of base rates, overreliance on small sample statistics). Happily, researchers have taken an increased interest in this area, and we can expect to learn more about the development of statistical reasoning skills in the near future. Several recent studies suggest that very young children may be quite competent at some aspects of statistical reasoning such as probability estimates (e.g., Acredolo et al., 1988), and even more competent than older children in some respects such as the use of base rates (Jacobs et al., 1989).

Still less is known about the developmental course of opportunities for acquiring the component skills of decision making. Here, we need work on such issues as the information ecology of different age levels (e.g., Where do kids get information? Is that information biased?) and the degree to which children of different age levels get practice at making decisions.

Finally, little is known about the development of shortcuts and heuristics for decision making. Such heuristics are well documented among adults. Presumably they serve as aids which increase the efficiency of decision making; however, they have also been shown to impair it sometimes (Kahneman et al., 1982). Some preliminary work with first graders (Jacobs et al., 1989) suggests that they may be less likely than adults to use the heuristic of representativeness, but with this one exception, the development of heuristics has been a neglected area of research.

4. <u>Does the developmental acquisition of decision-making skills look different for different types of decisions?</u> Answering this question requires a typology of decisions. For example, deciding whether to accept an invitation to smoke marijuana may be a structurally different kind of decision than deciding what to do after high school graduation. The former is a choice between doing a clearly specified action and not doing it, between A and not A. It requires the ability to consider all possible consequences of A and of not A, to assess accurately their probabilities of occurrence, and to know one's own values with respect to those consequences. In contrast, the latter decision about what to do

after high school is a choice among any number of possible actions which are not clearly defined for the decision maker. Thus, it requires somewhat different skills, such as the ability to think of a variety of possible alternative actions. A typology of decisions would clarify these differences among structurally different kinds of decisions, and permit a detailed analysis of the skills required for each.

Possible Shortcomings of a Decision-Making Approach

Although risk taking involves choice, and therefore a decision, analyzing risk taking from a decision-making perspective has some limitations. One is the problematic nature of the criteria that have been used to judge the optimality of a given choice. It seems reasonable to assume that making decisions in one's own best interests requires all the elements specified by decision theory (identifying options, identifying consequences, assessing the probability of those consequences, evaluating their desirability). However, it is more difficult to justify exactly how those elements should be combined in order to identify the best option. As mentioned, maximizing subjective expected utility (defined as the sum of the products for each consequence probability and its desirability) has been a common normative standard for rational decision making. The justification for that particular formulation is that over a large number of repetitions of a given decision, one can expect to achieve the most well-being if one always selected the option with the greatest subjective

expected utility (assuming one's judgments are relatively accurate).

One serious flaw in applying this standard to all decision making is that many decisions are made only once, or at most several times, and "there is a yawning gulf between the conduct that is rational in relation to a random choice related to a non-repeatable event, and the conduct that is rational when the event will recur very often and in similar circumstances" (Allais, 1979, p. 470, quoted in Lopes, 1988). For a decision that will be made only once, one's well-being may be served best by maximizing one's chances of attaining a particular goal, and the latter might result in a different choice than does maximizing subjective expected utility. For example, suppose a teenager faces a decision regarding whom to ride home with from a party, with the options, consequences, and the latter's values and probabilities as describe din Table 1. In this example, the subjective expected utility of option 1 [(-10)(.2) + (-5)(0) = -.20] is greater than that of option 2 [(-10)(.01) + (-5)(.8) = -4.1], and thus maximizing subjective utility would result in choosing to ride with John. However, since being badly injured is definitely the worst possible consequence of these options, another definition of maximizing well-being is selecting the option with the least probability of resulting in a very bad consequence, namely riding with Susan. Clearly, then, maximizing subjective utility is not the only appropriate normative decision rule for selecting among various options. Judging the optimality of people's choices will require

Table 1

Hypothetical Decision Example

Option	Option Consequences	Consequence Desirability	Consequence Probability
1. ride with John who is very popular and very drunk	a. be badly injured in a car accident	-10	.2
	b. have peers think you are square	- 5	0.0
2. ride with Susan who is very unpopular and sober	a. be badly injured in a car accident	-10	.01
	b. have peers think you are square	- 5	.8

more sophisticated normative standards.

Another problem with the criteria that have been used to judge the optimality of a choice from a decision-making perspective is their emphasis on instrumental rationality to the exclusion of other perspectives. Instrumental rationality focuses attention onthe degree to which each option can facilitate achievement of the decision maker's values. However, "personal . . . choices serve not merely to implement given systems of values, but also to define, and sometimes to reshape the values--indeed the very identity--of the choosing individual . . . The decision maker chooses not merely how to achieve his ends but what they are to be and who he is to become" (Tribe, 1973, p. 634-635). Unfortunately, decision theory is not well-suited to revealing, let alone analyzing the latter process.

Another problem faced by the decision-making perspective is the methodological difficulty of studying the various elements in the decision-making process and the decision rules people use for combining them. We can ask people what options and consequences they consider, what probabilities and values they attach to those consequences, and what decision rules they use to combine these elements and arrive at a choice. However, these various judgments and procedures used in the decision-making process are not necessarily deliberate, and people may have difficulty articulating their perceptions, values, and decision rules. Moreover, some of these elements may have unconscious components which are not accessible through introspection, and which might contradict their

conscious counterparts. For example, an individual asked about the probability of getting pregnant if she has intercourse without a contraceptive might produce a relatively accurate estimate of that probability. However, she might unconsciously feel that "it can't happen to me." In other words, her unconscious assessment of the probability of getting pregnant might be much lower than her conscious assessment. Since the unconscious assessment is open neither to direct observation nor to introspection, it would be extremely difficult to measure it, let alone to uncover its role in the decision-making process. Of course, such methodological difficulties are not unique to the decision-making perspective--they plague many of the other approaches to risk taking behavior described in the following section.

While none of these limitations need to be fatal to a decision-making perspective, they each suggest areas in which the approach needs strengthening.

Other Perspectives on Risk Taking

Several Alternative analyses of risk taking can be found in the literature, some consisting simply of variations on the basic decision-making formulation, others representing very different approaches and terminology. One variation on the decision-making formulation is Lopes's (1983, 1987) account of risk-related decision making. She argues that there are at least two different motives or needs that might affect risk-related decisions (Lopes, 1987): (a) the desire to avoid loss and (b) the desire to exploit

potential--to take advantage of an opportunity for gain. One can think of the desire to avoid loss as being motivated by fear--the more one fears loss, the more one will make choices that minimize the chances of loss. One can think of the desire to exploit opportunity as motivated by hope--the more one hopes for gain, the more one will make choices that maximize the opportunity for gain.

From this perspective, people sometimes take risks not only, or even necessarily, because the expected value of the possible gain outweighs the expected value of the possible loss, but also because they focus on the potential gain and pay little attention to the potential loss. This occurs even though they are aware of the loss, and even though the absolute value of the expected loss might be larger than the absolute value of the expected gain. It is as if their hope for gaining something outweighs their fear of loss, irrespective of the probabilities or absolute values of the possible gain and loss. Conversely, people sometimes chose not to take risks because their fear of loss outweighs their hope of gaining something.

If adolescents take risks that adults consider to be unwise, one reason may be that adolescents give relatively more importance to exploitive potential for gain, and relatively less importance to avoiding loss than do adults. And there may be good reasons for this differential emphasis between the two age groups. As Baumrind (1983) points out, "adolescence is the prototypical transition stage of development" (p. 3). It is a time when the individual is

changing roles vis-a-vis both one's parents (establishing one's independence from their authority) and society in general (making choices about career, partner, lifestyle, etc.). It therefore might not be surprising that adolescents would place considerable importance on exploiting opportunity--on exploring various ways of achieving independence from parents, of interacting with one's peers, of defining what one's future identity will be.

Even if considerable risk taking during adolescence can be healthy, some youth seem to take far more risks than others . . . and thereby cause adults far more worry. How might we account for such individual differences in terms of the two motives that affect risk-related behavior according to Lopes? She argues that individuals who take greater risks pay most attention to (i.e., focus on) the best possible outcomes in deciding whether or not to undertake an action, whereas individuals who take fewer risks pay relatively more attention to the worst possible outcomes (Lopes, 1987). She sees this difference as a dispositional factor representing individual differences in motives (risk takers being motivated by the desire for "potential," risk avoiders being motivated by the desire for "security"). In her formulation, the degree to which one tends to focus on the potential for gain is distinct from the value of that possible gain, just as the degree to which one tends to focus on avoiding loss is distinct from the value of that possible loss. In other words, two individuals may face a decision whose alternative options entail possible consequences that are valued identically by both people and of

which they are both aware. Yet, for motivational reasons, one may focus on and find irresistible the potential for gain, while the other may focus on the possibility of loss and find irresistible that option which minimizes the chances of incurring that loss.

These are at present only speculative hypotheses regarding individual differences in adolescent risk taking. Empirical work is needed along the lines of Lopes's demonstration of such individual differences in adult risk taking. Gardner et al.'s (1989) empirical studies of age differences in the degree to which people's choices are determined by a single dimension of risk-taking task (e.g., magnitude of possible gain, probability of gain, magnitude of possible loss, probability of loss) could also be extended to shed light on the applicability of Lopes's analysis to individual differences in adolescent risk taking.

A related way to think about individual differences in risk taking is that risk taking entails an emphasis on achieving success, while not taking risks entails an emphasis on avoiding failure. A large body of literature on achievement motivation (e.g., Atkinson & Feather, 1966; Atkinson, 1983) suggests that there are substantial individual differences in levels of aspiration and motivation to achieve those levels. This literature also suggests that these differences reflect, in part, different experiences with success and failure. Success seems to result in higher levels of aspiration, which in turn lead to greater motivation to achieve those higher levels. Failure, on the other hand, seems to result in lower levels of aspiration. From this

perspective, we might expect, for example, that adolescents who have experienced repeated failure in school will lower their aspiration level and be less likely to take the risks necessary for achieving academic success (i.e., less likely to hope for gain).

While some empirical work (Lopes, 1987) has begun to look at the interrelationship of these three proposed determinants of risk-related choices (motivation to avoid loss; desire to exploit potential; aspiration level), this is an area that deserves more attention by researchers. As Lopes points out, "Psychologists who study risk don't talk about a surprisingly large number of factors that are psychologically relevant in choosing among risks . . . here are some words that are not to be found in the theoretical vocabulary: fear, hope, safety, danger, fun, plan, conflict, time, duty, custom . . . If, however, hope and fear and plans are necessary ingredients in risky choice, then it is not unscientific to talk about them." (p. 287) If we are to understand adolescents' risk taking, we may need to look at their hopes, their fears, and their aspirations. If decision theorists think these can be represented by subjective probabilities and by desirability values, then they need to specify how that can be done.

Another perspective on risk taking would entertain the possibility that the very definition of risk is different for adolescents and adults. A series of studies by Slovic and colleagues (Slovic, 1987) has found that judgments of riskiness may be related to a variety of characteristics such as controllability,

catastrophic potential, and dread of potential loss. These characteristics are different from (though not uncorrelated with) the two defining characteristics of riskiness from the perspective of expected utility: The probability and magnitude of potential loss. These various potential defining characteristics may contribute differently to adolescents' and to adults' perceptions of riskiness. Again, empirical work is needed to test this speculative hypotheses.

A quite different perspective on risk taking (e.g., Farley, 1985; Zuckerman et al., 1980) emphasizes its sensation-seeking function. In this view, individual differences in risk taking reflect biological differences in optimal levels of stimulation and arousal (i.e., sensation seeking), the presumption being that engaging in behaviors which entail a chance of loss heightens one's level of arousal. People are thought to respond to risk per se, in contrast to decision theory which tends to see risk taking as but a by-product of making decisions involving risky outcomes (albeit one which a decision maker could conceivably consider when making a decision). According to the sensation-seeking view, the social environment, by virtue of the options it makes available, is an important determinant of exactly which activities one turns to for increasing (or decreasing) on's level of arousal. While this is an interesting hypotheses, its implications for understanding the origins or causes of risk-taking behavior are ambiguous. In particular, it is unclear whether risk seeking simply has biological correlates which share a common origin with

sensation seeking, or whether those biological correlates represent more independent determinants of risk seeking. Moreover, we found no clear empirical evidence in the literature that risk taking is a result of sensation seeking. A recent study (Benthin, 1988) examining the relation between sensation seeking and frequency of participation in each of 30 "risky" activities found that sensation seeking scores (as measured by several of Zuckerman's scales) accounted for at most 25% of the variance in participation (for the activity of using fireworks), and for less than 15% of the variance in participation for all but six of the activities. Thus, sensation seeking--at least as measured in Benthin's study--does not seem to be a major determinant of reported participation in these seemingly risky behaviors among her sample of 14-18 year-olds.

One other perspective on risk taking can be found in a number of theories which have emerged to explain a variety of deviant or "problem" behaviors, many of which are considered also to be "risky" (e.g., smoking, using drugs and alcohol, juvenile delinquency). Rather than focusing on the decision process per se, these theories stress the role of social environmental and/or personality determinants of engaging in such behaviors (e.g., Akers et al., 1979; Block et al., 1988; Jessor, 1984; Kandel, 1985; Kaplan, 1985). Although a considerable theoretical and empirical literature has developed around these theories, there is disagreement between them. For example, some theories place great importance on the role of peer influence in encouraging "problem"

behaviors (e.g., Akers, 1979; Kandel, 1985; Kaplan, 1985), while others take issue with that view and emphasize instead the importance of personality correlates of, for example, drug use (Block et al., 1988).

One common shortcoming of these approaches is the lack of validation for any causal ordering among correlates. Even those studies which have found preschool correlates of adolescent behavior (e.g., Block et al., 1988) have no way of demonstrating causal antedecence. Nevertheless, this set of theories offers an important complement to the more strictly decision-making approaches. The latter would do well to draw upon these theoretical formulations as they attempt to specify the most important determinants of decision making about "risky behaviors. Conversely, the social/environmental and personality theories would do well to follow the lead of decision-making approaches in trying to specify exactly how their hypothesized behavioral determinants lead to risk taking.

All of the above-mentioned approaches to analyzing risk taking need further development with respect to their intervention implications. For example, Kaplan sees "deviant' behaviors as emerging when a child experiences distressful negative, self-rejecting attitudes which result in a loss of motivation to conform and the acquisition of a motivation to deviate from the patterns of the groups to which s/he belonged when experiencing the negative self-evaluation. Is the implication of this theory that the way to reduce risky behavior such as illicit drug use is to give an

individual more positive, self-enhancing experiences in the company of non-drug users (assuming that were possible)? How does this compare with the implication of other approaches, including decision theory? Until such implications are spelled out by their proponents, one can only speculate about what these different approaches actually mean for practical interventions.

Adolescent Risk Taking: What is the Real Concern?

In our review of the decision-making literature on disk taking, we saw that there is as yet little evidence that adolescents are more likely than adults to engage in behavior that seems risky to them. That is, there is little evidence that they seek out or are willing to accept greater risks. However, neither is there clear evidence that they do not seek or accept greater risks. The lack on empirical evidence on this issue reflects, in large part, the dearth of information on how adolescents (and adults) perceive the options do they consider?, how well do they assess the likelihoods of their possible consequences?, how important are those consequences to them?). This lack of information on option and consequence perception and evaluation is not surprising, given the methodological difficulties involved in measuring these variables. However, without better evidence, it is hard to justify the accusation that teenagers are particularly prone to seek out or accept risks, particularly in light of the evidence reviewed above, albeit limited, that they may be just as competent as adults at a number of aspects of decision making about

risky behavior.

If there is little empirical evidence that adolescents seek or accept taking risks more than do adults, we might do well to inquire who they are so commonly accused of risk taking.

The issue of teenage sexual behavior and the risk of pregnancy might be particularly instructive in identifying the reasons for society's concern over adolescent risk taking. For example, the considerable controversy over whether to make contraceptives easily available to teenagers suggests that there may be something other than the risk of pregnancy that bothers adults about adolescents being sexually active. Likewise, the much greater concern expressed about the risks some adolescents take by smoking marijuana than about the risks many more adults take by drinking alcohol (the latter being an activity for which there is far more proof of deleterious effects) suggests that there may be something other than the possibility of negative behavioral or health effects that bothers adults about adolescents' smoking marijuana.

Exactly what these other concerns are is an open question. Sexual activity and taking drugs are adult behaviors. Indeed, that may be one reason why they are so appealing to adolescents--engaging in them can facilitate one's transition to adulthood (Silbereisen and Eyferth, 1986). Perhaps it is somewhat threatening to adults to see their children acquiring this new (and more equal) status. Or, perhaps these are simply behaviors about which adults are quite ambivalent themselves, being uncertain whether to condemn or condone them even in adults.

An additional consideration in trying to establish the origins of adults' expressed concern about adolescent risk taking is the implied disapproval of taking risks. Yet, there are many instances of risk taking by adults which are applauded. Astronauts, soldiers, mountain climbers, to name but a few, generally receive accolades for taking enormous risks. This, too, suggests that it may be something about the activities themselves, rather than their degree of riskiness, which determine whether they are condemned or condoned.

It is frequently pointed out that experimentation is particularly age-appropriate during the adolescent stage of development. Therefore, telling teenagers to "Just Say No" to using drugs may be "like telling Christopher Columbus to stay home" (Farley, in Landers, 1988). Thus, if adolescents are to be criticized for their risk-taking behavior, such criticism should spell out more specifically why it seems undesirable. This is especially important in light of arguments that risk taking can often help adolescents by building self-confidence, developing tolerance for stress, and learning to take initiative (Baumrind, 1987).

Summary and Conclusions

Adolescence is widely believed to be a stage during which one is more prone to take risks than at other age levels. Risky activities causing particular concern include use of illegal drugs, sexual intercourse, dropping out of school, smoking cigarettes, and

driving under the influence of alcohol. There is considerable concern among adults in our society that adolescent risk taking is often reckless and detrimental to their health and well-being. Such concern has led some opinion leaders and educators to suspect that adolescent decision making regarding whether to engage in risky activities may be faulty in some respects. As a result, researchers have begun to examine decision-making skills among adolescents, and to develop programs designed to improve those skills.

Our review of the empirical evidence on risk taking and of the literatures on cognitive development and decision-making skills has found mixed results regarding the degree to which adolescents may be taking more risks than other age levels. We also discussed a number of beliefs about adolescent risk taking and decision making for which there is very little empirical support to date. Moreover, even if adolescents are particularly prone to take risks, a case can be made that risk taking is particularly advantageous at this developmental stage.

Our review has also shown that we know very little about either overall decision-making competence among adolescents or the development of specific skills that are necessary for or facilitate effective decision making. This is an unfortunate lacuna in developmental psychology, particularly given the wide variety of daily activities in which individual decision making plays a role.

While understanding decision-making processes is clearly essential for understanding adolescent behavior, we have argued

also that the social-structural determinants of the choices adolescents make must not be neglected. Altering various aspects of the social-structural environment in which adolescents find themselves may be equally, or even more effective in improving the quality of their choices than are attempts to influence individual decision-making processes.

Finally, we have emphasized the importance of clarifying exactly what the real concern is about adolescent behavior. Is it their risk taking per se, or is it the particular activities in which they choose to engage? In either case, it would be useful for adults to be more explicit about the basis for their concern, so that we might better assess whether, and which, remedial steps are appropriate.

Endnotes

1. Identifying a chance of loss requires specifying a reference point from which loss (and gain) are measured. The latter may sometimes be less straightforward than it appears. For example, imagine a choice situation in which each possible outcome offers a significant gain. Although such a situation might be viewed as entailing no chance of loss, some individuals facing such a situation may view those outcomes affording the least gain as constituting failure or loss, using as a reference point the larger gains that might have been obtained. Others may view all the outcomes as gain, using as a reference point their current situation.

2. Loss is defined in terms of the actor's values.

3. To establish whether adolescents knowingly take more risks than adults knowingly take with respect to a given decision situation, we would need to know what options and consequences each one consciously considers, how each one perceives the probabilities associated with these consequences, how they value them, and how they integrate all of these factors when making a decision about what to do.

4. Beyth-Marom et al. (1987) have developed an instructional model for decision making under uncertainty in which cognitive abilities and educational objectives are specified for each of the normative steps of the decision process.

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